GEORGIA INSTITUTE OF TECHNOLOGY OFFICE OF CONTRACT ADMINISTRATION

PROJECT ADMINISTRATION DATA SHEET

[X] ORIGINAL [ ] REVISION NO. _____

Project No. G-35-621 (R6065-0A0) GTRC/GIT DATE 11 / 14 / 85

Project Director: Dr. Luther Roland School/~~Lab~~ Geophysical Sciences

Sponsor: Spelman College

Type Agreement: Award Letter dated 11/5/85 (Under NSF Grant No. ATM-84-12423)

Award Period: From 1/15/85 To 1/15/86 (Performance) 1/15/86 (Reports)

Sponsor Amount:	This Change	Total to Date
Estimated:	$ 6,758	$ 6,758
Funded:	$ 6,758	$ 6,758

Cost Sharing Amount: $ None Cost Sharing No: N/A

Title: RUI-The Chemical Composition of Precipitation at a Southeastern Urban Site

ADMINISTRATIVE DATA

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Defense Priority Rating: N/A Military Security Classification: N/A

(or) Company/Industrial Proprietary: N/A

RESTRICTIONS

See Attached NSF Supplemental Information Sheet for Additional Requirements.

Travel: Foreign travel must have prior approval – Contact OCA in each case. Domestic travel requires sponsor approval where total will exceed greater of $500 or 125% of approved proposal budget category.

Equipment: Title vests with none proposed or anticipated.

COMMENTS:

SPONSOR'S I. D. NO. 02.400.019.86.001

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GEORGIA INSTITUTE OF TECHNOLOGY OFFICE OF CONTRACT ADMINISTRATION

SPONSORED PROJECT TERMINATION/CLOSEOUT SHEET

Date 11/24/86

Project No. G-35-621 School/~~XXX~~ Geo. Sci.

Includes Subproject No.(s) N/A

Project Director(s) L. Roland GTRC / ~~XXX~~

Sponsor Spelman College

Title RUI-The Chemical Composition of Precipitation at a Southeastern Urban Site

Effective Completion Date: 1/15/86 (Performance) _____ (Reports)

Grant/Contract Closeout Actions Remaining:

Reporting will be done under G-35-687

- [ ] None
- [X] Final Invoice or Final Fiscal Report
- [ ] Closing Documents
- [ ] Final Report of Inventions
- [ ] Govt. Property Inventory & Related Certificate
- [ ] Classified Material Certificate
- [ ] Other _____

Continues Project No. _____ Continued by Project No. G-35-687

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DEPARTMENT OF CHEMISTRY
Spelman College

Dr. Albert Thompson, Principal Investigator
NSF Grant No. ATM841223

ACID PRECIPITATION AT A SOUTHEASTERN URBAN SITE

PROGRESS REPORT
January, 1986

Submitted to:

The National Science Foundation

NSF PROGRESS REPORT

The primary objective of our research project is to study the present nature of and future trends in atmospheric precipitation in an urban southeastern environment. Our specific objectives are:

a) assess the chemical nature of rain in an urban southeastern site;

b) provide this information on a long term basis in order to decipher chemical trends with time;

c) provide training for undergraduate students in the techniques of collection and analysis; and

d) provide an opportunity for interaction between Spelman and Georgia Tech faculty and students in a critical research area of current importance in the environmental sciences.

The progress towards these objective is now given.

Assess the Chemical Nature of Rain

The proposed plan was to study the chemistry of rain at a southeastern urban site. We proposed to sample wet-only atmospheric precipitation on an event basis and to determine an extensive suite of chemical species. We have made significant progress towards achieving our objectives.

The collection site was established adjacent to the Dolphus E. Milligan Science Research Institute (DEMSRI) building. The rain collector is located on a level platform within a 30m x 30m fenced in area. The area was overlaid with a plastic covering and gravel dust to help control weeds. No structures, protuberances or vegetation adjacent to the site obstruct or interfere with the collection of precipitation. It meets the National Acid Deposition Program (NADP) established protocol for new site location. Furthermore, the site allows convenient access and has been free from problems of vandalism.

Two collocated Aerochem Metrics Model 301 collectors have been used. We have routinely analyzed for the inorganic species measured by NADP and other standardized programs: H^+, Na, K, Mg, Ca, NH_4, SO_4, NO_3, Cl. The bulk of these are determined by ion chromatography.

Forty-four precipitation events have been collected since the site was established. All of the above mentioned chemical species have been identified at various levels from different samples. Table 1 lists the median values and ranges for all species from these events.

TABLE 1
Species Identified in Precipitation from
Events Collected During First Year

Species	Range (ppm) (Low)	(High)	Median (ppm)	Frequency of Occurrence (%)
Na	0.01	3.52	0.12	69
Mg	0.01	8.13	1.71	25
Ca	0.09	2.58	0.25	31
NH_4	0.03	0.79	0.29	56
K	0.04	0.89	0.15	22
Cl	0.11	2.14	0.40	78
NO_3	0.13	11.66	1.52	78
SO_4	1.22	14.85	4.11	50
H(pH units)	3.25	4.96	4.46	100

All of the cation/anion measurements are carried out using a Wescan Dual-Channel Ion Chromatograph with recording integrator. The pH is measured using a Ross combination electrode. A deionized water system from Continental Water Systems is installed at the DEMSRI. It consists of two deionizers and one organic filter. The water from this system is used for dilutions, making of standards and final rinses of laboratory glassware, utensils, sample vials and containers.

Our major effort during the first year was devoted to the following:

a) organizing the project, establishing protocol and writing standard operating procedure (SOP);

b) purchasing materials, supplies and chemicals;

c) selecting and purchasing equipment;

d) identifying and selecting undergraduate research participants; and

e) establishing the collection site.

We have now begun to analyzed the data in terms of correlations with other meteorological variables. This will be a major focus of our second year's effort.

Provide This Information on a Long Term Basis

This objective can only be achieved over a longer period of time. We currently have over 6 months of data as a part of this effort. Our primary aim with this objective is to decipher chemical trends with time.

Provide Training for Undergraduate Students

The involvement of undergraduate students in a current and critical research area is a key objective of our research effort. To our pleasure, the number of student participants has been quite satisfying. Four students have participated and were supported by the grant: Cynthia McCloud, Sharmayn Champion, Alison Kean and Lisa Jackson. Cynthia and Sharmayn were summer participants while Alison and Lisa are presently participating.

In addition to the students who were supported from the grant, a number of other students have participated in the research project. These include, Benita McGhee, Michael Boakye-Danqual, Colette LaViolett and Carol Ray. These students have participated in various aspects of the project such as sample collection, sample analysis, data interpretation, data analysis, quality assurance/quality control protocol, etc. In addition, the summer participants were required to write a paper and present their research involvement as a part of the seminar series for the Undergraduate Research Program in Earth and Atmospheric Sciences (URPEAS).

Provide an Opportunity for Interaction

Another key aspect of the research effort was to provide an opportunity for interaction between Spelman and Georgia Tech faculty and students. Dr. Roland of Georgia Tech has actively participated on the project on a routine basis. Dr. Beck of Georgia Tech has been working on establishing a procedure to routinely determine reduced sulfur compounds. In addtion, we have access to the atomic absorption spectrophotometer in Dr. Beck's lab to conduct periodic comparisons between different methods of analysis.

We have also had interactions with other professionals in the area. The investigators participated in a workshop on "Acid Precipitation" sponsored by the School of Geophysical Sciences at Georgia Tech. Dr. Thompson has attended a short course and a symposium sponsored by the Department of Energy-Argonne National Laboratory. The short course was titled, "Analytical Techniques for Organics In Energy-Related and Environmental Samples", June 26-28, 1985. The symposium was titled, "Acid Rain Control: Developing a Consensus for Action", August 14-16, 1985.

Proposed Activities for Second Year

The emphasis in the second year will again center around our specific objectives as stated in the beginning. To further accomplish these objectives, we will include the following activities in addition to continuing the ones already underway:

1) incorporate the procedure for the determination of reduced sulfur, low molecular weight fatty acids, and total acidity on a routine, frequent or as needed basis;

2) establish a collection protocol and analytical procedure to determine low molecular weight organic acids;

3) collect some subevent samples for analysis;

4) to complete the SOP manuals for our site; and

5) interpret the analytical data in terms of rain intensity, seasonal, meteorological and other atmospheric factors, and known antropogenic emission sources.

In addition, we will seek opportunities for other interactions with experts in the field.

Residual Funds

As of March 31, 1986, the residual funds will total $4868.